Beckmann, J. F. (2015). Of quadrants and Fish Scales: Reflections on new directions in research in child and adolescent development. *New Directions for Child and Adolescent Development, 147,* 123-129.

Of Quadrants and Fish Scales: Reflections on New Directions in Research in Child and Adolescent Development

Jens F. Beckmann

Durham University

j.beckmann@durham.ac.uk

Abstract

In this article I reflect on how ways of reporting research as well as reviewing and commenting on submitted manuscripts could take new directions to promote progress in the discipline of developmental science. I argue for (a) attitudinal openness toward migratory impulses in the relation to Stokes' quadrant model of science, (b) the relinquishment of an unproductive sense of problem ownership in authors, reviewers, and commentators, (c) active attempts to fill intra- and interdisciplinary gaps rather than solely focusing on strengthening existing islets of disciplinary expertise, (d) a strategic diversification of expertise in the selection of reviewers and commentators, (e) adopting a communication style that can be described as deferential transgressions, and (f) promoting attempts for trans-disciplinary replications.

Progress in general can be brought about in at least two ways. One approach is where we keep going into the same direction, but faster or more efficiently. The other approach is to take new directions altogether. Whereas we might know where we are going when we keep doing what we have been doing, we might not quite know whether taking new directions will result in what then can be considered progress. I myself experienced such uncertainty when the incoming editor of *New Directions for Child and Adolescent Development* asked me to write an opinion piece for this journal, as I would not necessarily consider myself a dedicated specialist in child and adolescent development. Shifting the focus to "new directions" instead tempted me to resist an initial impulse. Triggered by the notion of non-specialists versus specialists, an idea came to mind that some might refer to as Benchley's Law of Differentiation. It states that there are two kinds of people in the world, those who do believe that there are two kinds of people in the world and those who do not. The attractiveness of this "law" stems from its implicit promise of explanatory power in a most parsimonious way. Therefore it is not surprising to also find a few of its various manifestations in the world of research. One of which is the notion that research is either basic or applied.

It may seem that we nowadays are finding less often explicit references to this particular dichotomy. Would this already be an indication of progress? Not necessarily. I would argue that a declining salience of this dichotomy is mainly due to the tendency of academic journals to more or less narrowly define their thematic and methodological scope. The subsequent segregation in the way what kind of and how research is reported reduces the necessity to explicitly call upon the "law of differentiation."

A journal such as *New Directions for Child and Adolescent Development*, however, is intentionally less segregated in these respects and therefore provides an arena where we still have the chance to encounter potential conflicts that are originated in the persisting, albeit implicit dichotomous worldview. In this article, I argue that an inhomogeneity in research foci and methodological approaches provides opportunities for taking new directions in addressing conceptual and practical barriers that tend to stifle progress and development in our field.

Basic research is characterized by its primary concern to contribute to the general knowledge and understanding of nature and its laws without thoughts of practical

ends. Applied research, on the other hand, is directed toward some individual or group or societal need or use and without seeking a deeper understanding of scientific implications. In addition to these rather generic criteria, both category labels carry a rather fuzzy range of more or less implicit connotations, some of which are value-laden. Consequently, any attempts to categorize the various contributions in this issue as representing either basic or applied research will ultimately turn into a moribund task. For instance, whereas researchers might agree with the idea of controlled experimentation, subscribing to the notion of being disinterested, if not uninterested in the application of research findings might be challenged. On the other hand, so-called applied researchers' pursuance of a mission "to make the world a better place" might not necessarily be coupled with a disregard of scientific principles.

Deviating from a strict dichotomous model and attempting to place the articles on a continuum between "basic" on one end and "applied" on the other would still imply that being closer to one pole means being farther from the other. Also, work that were positioned anywhere in the mid region of this scale would signify some sort of "neither-nor research."

In contrast to both a discrete, dichotomous model and a continuous model, one might adopt a (semi-)dynamic view, which is underpinned by the assumption that resources invested and efforts exerted in the context of basic research will eventuate in form of applicable results that help to solve real-life problems. While this view will not necessarily help solving the conundrum of sorting the articles in this issue, this model is also plagued with two major limitations. One is that it implies a *unidirectional* cause–effect relationship (i.e., understanding precedes use and hence the label "semi-dynamic"). And the other is that it begs the question whether applied research, by attempting to address a real-life issue without worrying about the underlying conceptual understanding, then has to be perceived as attempted unscientific shortcut.

Donald Stokes (1997) gives an interesting account of how to overcome the unproductive basic-applied schism. He uses the work of Louis Pasteur as an exemplar to show that neither a purely dichotomous model (i.e., either basic or applied) nor a continuous model (i.e., research can be placed anywhere between the two poles of basic and applied) is suitable to think about research. He subsequently introduces a framework that is based on the fundamental question of what the initiating motives

behind the respective research activity were. The answers to two questions determine where a particular research is to be positioned in a two-dimensional conceptual plane. The two questions are: "Is the research inspired by considerations of use?" and "Is the research inspired by the quest for fundamental understanding?"[1] This two-dimensional model (see the left panel in Figure 1) allows representing research that is both interested in solving so-called real-life problems and is interested in gaining fundamental understanding. The quadrant that accommodates "use-inspired basic research" has been labeled as Pasteur's quadrant. The prototypical occupant of the upper left quadrant (labeled "pure basic research") is Niels Bohr with his research related to the atomic structure being considered purely discovery-focused. Thomas Edison is the chosen representative of research that is guided solely by applied goals (see quadrant labeled "pure applied research" in Figure 1).

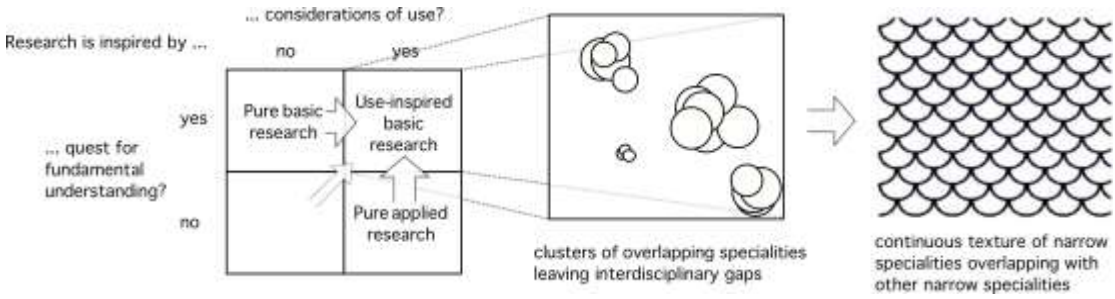

Figure 1: Combining Stokes' Quadrant Model of Scientific Research (Stokes, 1997, p. 73) and Campbell's Fish-scale Model of Omniscience (Campbell, 1969, p. 329) to identify directions for progress in research and reporting of its results.

I argue that progress in a (meta-)discipline such as developmental science can be achieved by aiming to populate Pasteur's quadrant. This would not mean for a journal such as *New Directions for Child and Adolescent Development* to only accept manuscripts that justifiably deserve the label of "use-inspired basic research." I rather see potential for conceptual, methodological, and application-related progress by means of directing and facilitating migration processes into Pasteur's quadrant.

Populating Pasteur's quadrant will have to be accomplished collectively. One approach would be to intentionally expose manuscripts to the productive scrutiny of peers who do *not* share the postcode of the quadrant the research seems to originate

[1] It is worth noting that although adhering to the doctrine of parsimony by introducing a dual dichotomy [i.e., two questions with dichotomous answer options], the discussion can be progressed in a new direction.

from. This obviously would deviate from common practice where peers are invited to provide feedback on manuscripts that are preferably related to their respective field of expertise. I envision a practice that strategically deviates from that to facilitate migrations into Pasteur's quadrant while also ensuring the quality of submissions. For instance, research that seems predominantly driven by attempts to find "what works," will benefit from impulses that emphasize the quest for an understanding as to why. Research that seems primarily concerned with increasing conceptual understanding should be exposed to encouragements to speculate about answers to the "so-what question."

At this stage, I can identify at least two prerequisites to the effectiveness of such approach. The first is to overcome a false sense of problem ownership that often develops as a side product of acquired expertise. As understandable as this might be it carries the risk of holding back progress, especially in relation to migration attempts into Pasteur's quadrant. Real-life problems rarely are of a mono-disciplinary nature. Hence, answers or solutions that subject experts might be able to provide are likely to have limited impact. This, again, emphasizes the importance of a collective approach. The potential success of such collective approach depends to a great extent on the second prerequisite, which is the requirement for a specific communication culture. I would like to see a communication style of deferential and considerate transgressions. A collective approach to the migration into Pasteur's quadrant should also include commentaries from peers who are invited with the same agenda of a strategic diversification of expertise in mind. A journal then becomes a forum for what might be called distributed research where different papers offer different answers to the same or related questions.

This notion of strategic diversification of expertise resonates with Donald Campbell's model of omniscience introduced in a seminal chapter published in 1969. A deliberately diverse combination of reviewers and commentators could achieve what Campbell (1969) called "collective comprehensiveness through overlapping patterns of unique narrowness" (p. 328). Such approach could not only help populating Pasteur's quadrant, it also could prove instrumental to counteracting an ethnocentrism of (sub-)disciplines, which is likely to produce redundant clusters of highly similar specialities—albeit with sophisticated depth—but leaving inter- as well

as intra-disciplinary[2] gaps (see the middle panel in Figure 1). Progress in terms of new directions (rather than aiming for more of the same with greater efficiency) should focus on those gaps.

Campbell also makes reference to the guilt scholars tend to feel when they realize that they might have not read what others have read in the field central to their academic identity. We all know that reviewers can be very effective in evoking such feelings of guilt. However, the guilt of neglect, so Campbell, is the inevitable predicament of all. Once one acknowledges that scientific competence can never be embodied in single minds, the sense of guilt should be (re-)directed into an ambition that one's individual pattern of inevitably incomplete competence covers areas neglected by others. This would, in Campbell's terms, constitute a novel fish scale in his model of omniscience contributing to "… a continuous texture of narrow specialities that overlap with other narrow specialities" (Campbell, 1969, p. 328, see the right panel in Figure 1). The overlap of multiple narrow specialities can be facilitated through collective communication characterized by deferential transgressions. I believe that *New Directions for Child and Adolescent Development* is well positioned to effectively instigate and mediate such communication.

To help bridging inter- or intra-disciplinary gaps (i.e., stimulating the emergence of novel-fish scales), the journal should aim to defy the common tendency to favor statistically significant, novel results over replication studies or studies that report inconclusive results or non-effects. This is not just a (repeated) call for "simple" replications, which, of course, have high, although underappreciated value for disciplines. I wish to include studies that aim to replicate effects "discovered" in one sub-discipline within developmental sciences in the conceptual and methodological context of another. These kinds of trans-disciplinary replications should not be constraint to empirical studies, but should also include re-enactments of lines of descriptive and explanatory arguments in the context of a conceptual framework different from the originating one. Such approach will serve as a validity check for generalizations that often are based on rather narrow foundations.

[2] The meaningfulness of a distinction between "inter-disciplinary" and "intra-disciplinary" depends on the self-image of the respective researcher. Conceptual, methodological, or application gaps appear to be interdisciplinary for colleagues who identify themselves primarily as neuroscientist, geneticist, psychologist, anthropologist, sociologists, educationalist, and so forth. For developmental scientists, those gaps will be perceived as intra-disciplinary.

In conclusion, on a conceptual level, I argue for (a) attitudinal openness toward migratory impulses in relation to Stokes' quadrant model of science, (b) the relinquishment of an unproductive sense of problem ownership in authors, reviewers, and commentators, and (c) active attempts to fill intra- and interdisciplinary gaps rather than solely focusing on strengthening existing islets of mono-disciplinary expertise. On a practical level, I argue for (d) a strategic diversification of expertise in reviewers and commentators, (e) facilitating a style of deferential transgressions in cross-disciplinary communication, and (f) promoting attempts for trans-disciplinary replications.

I would like to thank all the contributors to this special issue for confronting me with a situation that resulted in some hopefully productive transgressions and I would like to thank the editor of *New Directions for Child and Adolescent Development* for her encouragement to share them. I also hope that all the brilliant thinking that went into producing the interesting contributions to this special issue was not only *informative* but will also be *formative* in its implementation in (research) practice, policy making, public understanding, and behavior.

References

Campbell, D.T. (1969). Ethnocentrism of disciplines and the fish-scale model of omniscience. In M. Sherif & C.W. Sherif (Eds.), *Interdisciplinary relationships in the social sciences* (pp. 328–348). Chicago, IL: Aldine.

Stokes, D.E. (1997). *Pasteur's quadrant. Basic science and technological innovation*. Washington, DC: The Bookings Institution.